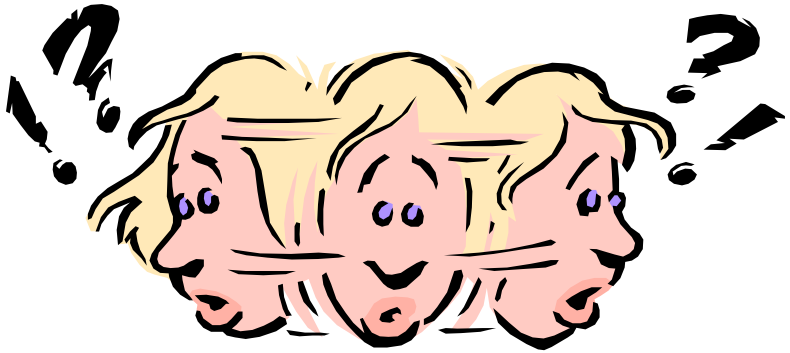
Integrated Water Resources Management

Definitions and Principles, Impediments and Solutions

Findings from a Policy Study

Buzzwords abound

- Comprehensive
- Holistic
- Integrated
- Watershed “stuff”
- Holistic Comprehensive Integrated Watershed Management



Confusion abounds too.
This confusion impedes communication.

Yet the Corps is committed to Integrated Management

- The Civil Strategic Plan seeks to move the Corps towards a more integrated approach to water resources management, and
- because the Corps is seriously re-evaluating the future of the Civil Works program and how it can best serve the nation.

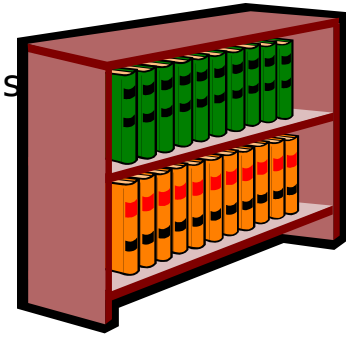
experience has taught us that single projects with a limited focus may solve individual problems, but if we look at problems and solutions from a wider geographical view, we can better balance economic, environmental and quality of life objectives. Flowers 8 April email .

Hence the Task

- Define IWRM based on historic and current definitions,
- Describe the close relationship of IWRM to the Corps' watershed approach
- Develop some principles for IWRM, and
- Identify impediments to integrated management and suggest ways to improve integration within the CW Program.

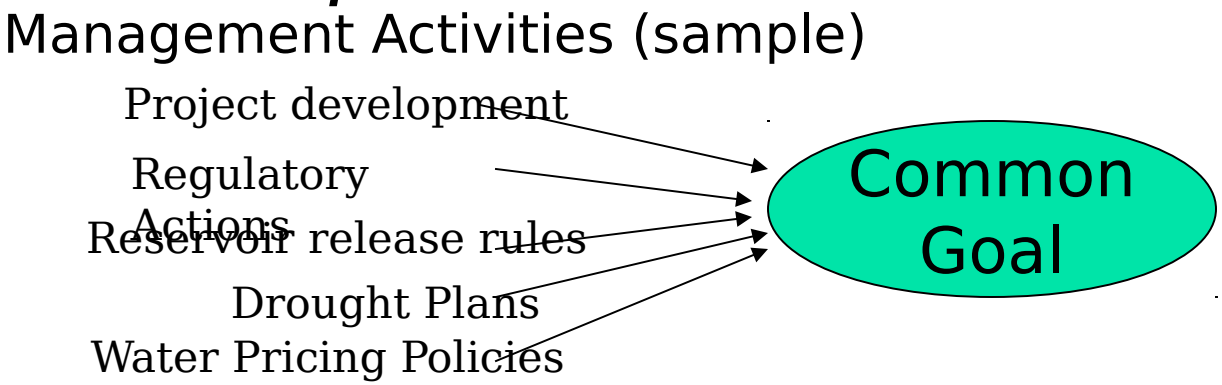
OK – What do we mean?

- Integrated (adj.)
  - *Defn:* combining or coordinating separate elements so as harmonious, interrelated whole
  - *syn.* comprehensive, blended, harmonized, mixed, synthesized
  - *Ant.* disintegrated
- Water Resources (n.)
  - *Defn:* water bodies including all of their variously integrated and separate physical, chemical, biological, economic, cultural, and other useful parts and processes
  - *examples:* wetlands, streams, rivers, lakes, canals, reservoirs oceans, glaciers, geothermal steam, groundwater, aquatic life, sediment, nutrients, oxygen…and ducks
- Management (n.)
  - *Defn.* purposeful actions taken to effect desired change , often to achieve stated objectives
  - *syn.* control, handling
  - *examples:* land use, impoundment , regulation, pollutant discharge, s control measures, demand reduction policies



Basic Working Definition

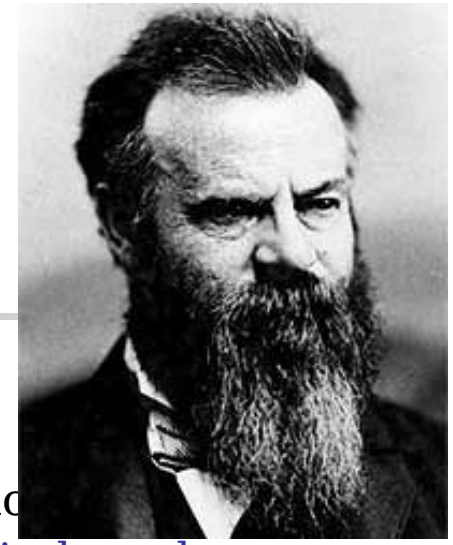
- *Integrated Water Resource Management is the coordination of activities in pursuit of a set of common goals for water resources development and maintenance.*



From the basic definition we can make some observations

- **IWRM is a process -** not a goal;
- **IWRM is goal-driven –** but not tied to any single goal;
- **IWRM is a matter of degree -** not all or nothing

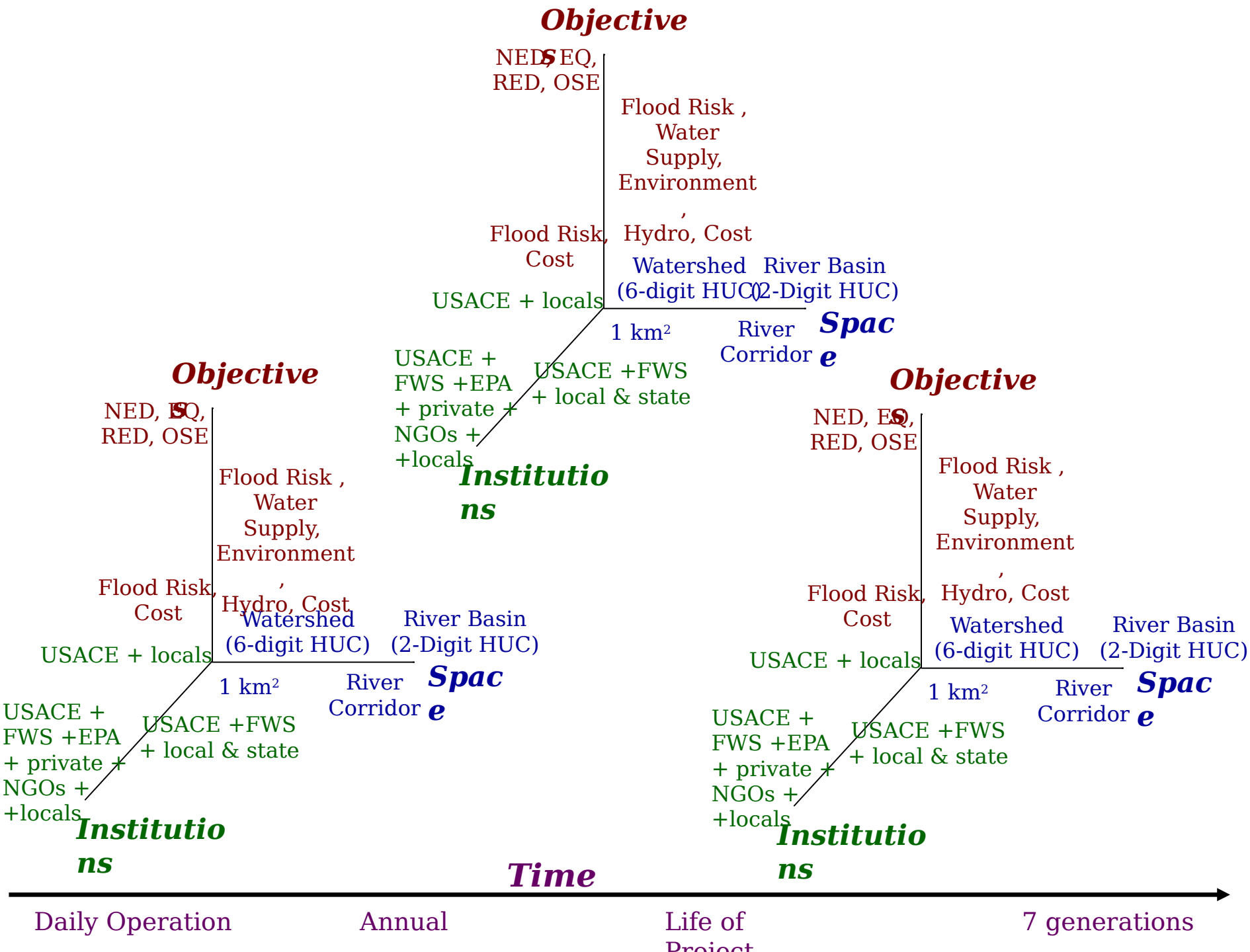
History of IWRM



- In 1873 F.B. Hough called for integrated watershed protection measures with reservoir construction for improved water supply and for flood damage reductio
- Late 1800s, John Wesley Powell envisioned river basin-based planning that integrated watershed condition, climate and reservoir development to provide for irrigation in the west
- The 1907 Inland Waters Commission reported that “every river system is a unit from its source to its mouth and that it should be managed as such”
- In 1909 the USGS declared: *the subjects of irrigation, forestry, power, domestic water supply, drainage and navigation are all closely interrelated and should be thoroughly studied together, not only in the arid but in the humid regions.*
- TVA (1933) was a single agency that pursued regional and national welfare improvement through an integrated planning and management process framed in a river basin context.

History suggests a *conceptual framework* for integration

- *Spatial integration* – is coordination of one or more policies, programs, projects, and management measures toward achievement of some previously determined result within a geographic area;
- *Objective Integration* – is coordination of one or more policies, programs, projects, and management measures toward some previously determined optimum or other combined achievement of multiple objectives, such as flood control, navigation, recreation, and hydropower
- *Institutional Integration* – is coordination across the mandates, missions, policies, programs, projects, and management measures of various governmental and nongovernmental institutions
- *Time* – integration may consider interaction on different time scales, from daily operations, to consideration of conditions decades or centuries into the future.


Objective
NED, EQ, RED, OSE
Flood Risk , Water Supply, Environment ,
Flood Risk, Cost
Hydro, Cost
Watershed (6-digit HUC)
River Basin (2-Digit HUC)
USACE + locals
1 km²
River Corridor
Spac e
USACE + FWS +EPA + private + NGOs + +locals
USACE +FWS + local & state
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Spac e
USACE + FWS +EPA + private + NGOs + +locals
USACE +FWS + local & state
Institutio ns
Time
Daily Operation
Annual
Life of Project
7 generations

So does this mesh with current use of the term IWRM?

- ***Global Water Partnership –*** *[IWRM is] a process that promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.*
- ***U.S. Agency for International Development (USAID)*** *- IWRM brings together governments, communities, and other stakeholders to choose an alternative uses of freshwater and coastal resources. Using a participatory planning and implementation process, these stakeholders identify ways to meet their diverse water needs without depleting or damaging water resources and their underlying ecosystems.*
- ***World Bank -*** *An integrated water resources perspective ensures that economic, environmental and technical dimensions are taken into acc the management and development of water resources.*
- ***Inter-American Development Bank*** *- IWRM: water resources management where the aim of its actions and projects also includes the allocation of water and decreasing of conflicts between competitive water resource subs and uses, both in quantity and in quality. …It is the process of diagnosing, responding to and resolving water use probl acknowledging their interrelationships*

US Agencies use "Watershed Approach" Instead of IWRM.

Agency	Definition
Unified Federal Policy on s	"Watershed approach: A framework to guide watershed management that: (1) uses watershed assessments to determine existing and reference conditions; (2) incorporates assessment results into resource management planning; and (3) fosters collaboration with all landowners in the watershed. The framework considers both ground and surface water flow within a hydrologically defined geographical area."
U	"The watershed approach is a coordinating framework for environmental management that focuses public and private sector efforts to address the highest priority problems within hydrologically-defined geographic areas, taking into consideration both ground and surface water flow."
USDA-Forest	The watershed approach prevents relying solely on site-based information

PGL-61 outlines the Corps Watershed Perspective

Watershed Perspective is the viewpoint, which requires that all activities be accomplished within the context of an understanding and appreciation of the impacts of those activities on other resources in the watershed. The watershed perspective encourages the active participation of all interested groups and requires the use of the full spectrum of technical disciplines in activities and decision-making. This viewpoint takes into account (1) the interconnectedness of water and land resources, (2) the dynamic nature of the economy and environment, and (3) the variability of social in time. It recognizes that watershed activities , and that the strategy for managing the resour tershed needs to be adaptive.

PGL–61 touches on the four axes suggested earlier

- *Spatial Integration:* "appreciation of the impacts of those activities on other resources in the watershed*"
- *Institutional Integration:* "encourages the active participation of all interested groups"
- *Integration over Time:* "management … needs to be adaptive"
- *Integration over Objectives:* "Management should achieve a desirable balance among multiple, and often competing, watershed goals and objectives"

**Watershed* - an area of land within which all surface waters flow to a single point

**Watershed* - the area necessary to adequately scope, analyze and manage related water and land resources.

So if IWRM is a *Process* – What should be the Goal?

Source	Goal
PGL 61	Use of the water resources in a manner that is sustainable, taking into account environmental protection, economic development, and social well-being
EOP	Strive to achieve environmental sustainability
Strategic Plan	Provide sustainable development and integrated management of the Nation's water resources.
NEPA	Encourage productive and enjoyable harmony between man and his environment; promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; enrich the understanding of ecological systems and natural resources important to the Nation
P&G	To contribute to national economic development consistent with protecting the Nation's environment, pursuant to national environmental statutes
PCSD Report	Sustainability as balancing of three major elements: environmental health, economic prosperity and social well-being

This review suggests a GOAL for IWRM for the Corps

- **The Goal of Integrated Water Resources Management within the Corps' CW program is sustainability.**

- Such a goal is compatible with national and agency goals for water resource management.

But how do you operationalize sustainability?

- If a broadly accepted river basin plan exists, lets assume that the plan is a surrogate for sustainability
- This plan will guide management decisions – development, state/local policy, regulatory decisions, etc.
- Consult the plan and determine if the management action is consistent with the plan.

But generally there ain't no plan

- Instead various federal, state, and local laws constrain actions – they tell you which actions are acceptable and which aren't
- And then we have to compare the acceptable alternatives.
- For this we need to take the broad vision for management (sustainability) and translate it into a management plan.

Hence some Principles - USACE

EOP

- Balance economic considerations
- consider environmental consequences
- Seek balance and synergy
- Accept corporate responsibility and accountability
- Assess and mitigate cumulative impacts
- Build and share an integrated knowledge base
- Respect the views of individuals and groups

PGL-61

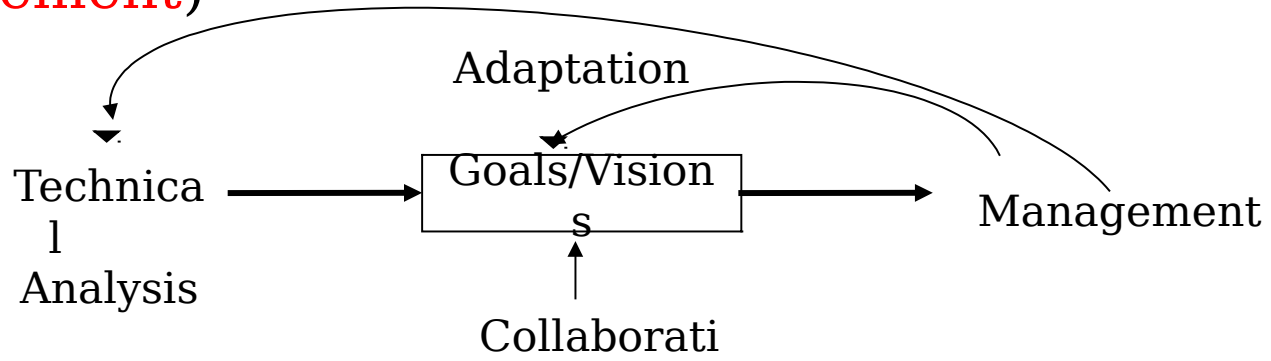
- Coordinated planning and management
- Interagency cooperation
- Leverage resources and integrate programs/ activities
- Identify future water resource use demands
- Use interdisciplinary teams
- Public input
- Evaluate of trade-offs

Strategic Plan

- Systems Approach
- Spatial or Geographic Integration
- Balance Across Multiple Uses or Functions
- Collaborative Approach

This suggests four principles for IWRM

- Define a Common Vision for Management – put details on the overall notion of sustainability
- Conduct a high-quality technical analysis that considers interrelationships among resources, and across space and time. (A systems approach)
- Collaborate with other governmental and non-governmental institutions and the public
- Modify decisions in a structured format based on new technical and value-oriented information (adaptive management)

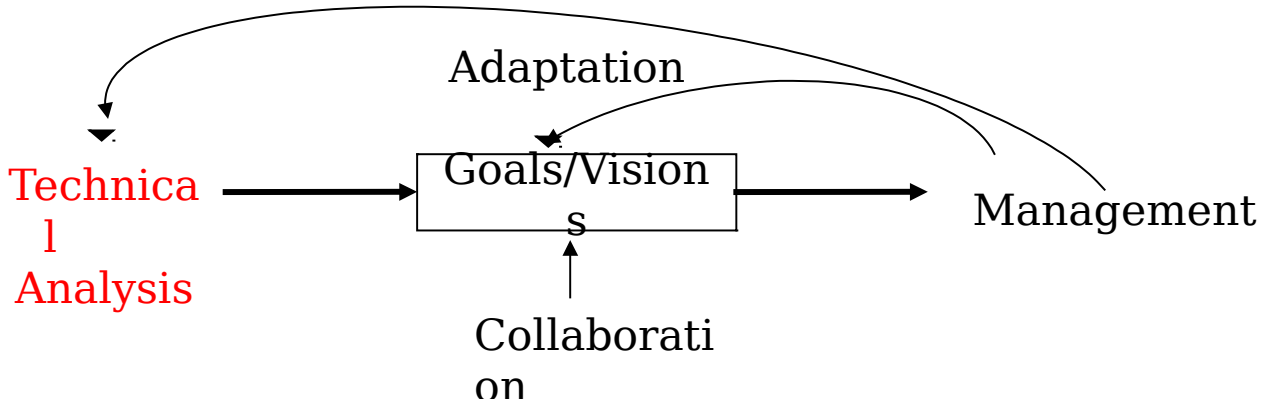


Impediments to developing a Common Vision for Management

- lack of coordinating structures to integrate responsibility for management,
  - local watershed councils, WRPA river basin commissions, other models
  - American Heritage Rivers program
  - Shared Vision Planning process
  - Division-wide water quality control program
- lack of effective representation of the broad public interest
  - Federal interest – P&G, LEDPA
  - Local Cost Share
- Corps-specific organizational structures and processes
  - Stovepipes
  - Colors of Money
  - Business lines?
- lack of widely-accepted means of making tradeoffs between objectives
  - NED-NER protocol
  - Monetization debate

Impediments to developing a Integrated Technical Analysis

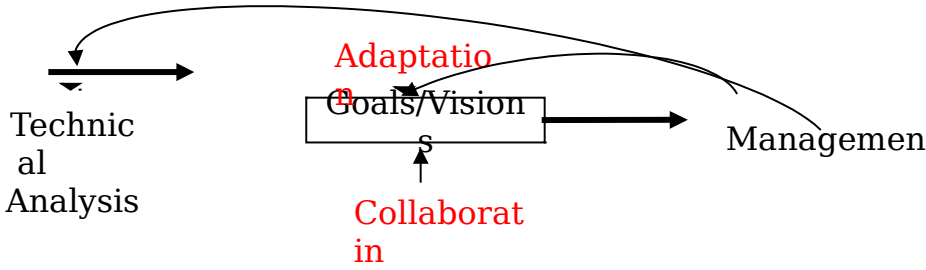
- lack of knowledge of systemic interactions (e.g. ecology, climate, risk);
  - Makes forecasting more difficult and management less effective
- lack of sufficient technical expertise within the Corps and the federal government in general
  - Retirements, decline in desirability of federal service
- institutional incentives against an integrated analysis; and
  - Benefits are measured for primary purpose(s)
- a project instead of systematic or programmatic focus within the Corps.
  - NED-NER protocol
  - Monetization debate



Impediments to developing a Collaboration & Adaptive Mngmt

- questions as to the value of collaboration in improving management
  - participants in a collaborative process are frequently self – selected, and thus may not adequately reflect societal values,
  - participative process too frequently lack a structure for decision making, and a solid technical basis upon which to make decisions
- institutional structures within the Corps that inhibit the Corps' ability to collaborate when not leading an effort.
  - Time must be billed to Corps-led projects

- build and hand-over nature of most projects
  - funds that can be used for monitoring is limited; responsibility for adaptive management left to local partner
- Congressional micro-management in the authorization and appropriations process limits the flexibility for changes in operation
  - major revision to project operation requires Congressional approval (216)



Summary

I believe the future is to look at watersheds first; then design projects consistent with the more comprehensive approach. We know that will require early and continuous collaboration but we believe it will prevent lawsuits later…the Civil Works program will focus on local concerns while coordinating national resources in an open, collaborative decision-making process. We do not take sides or dictate solutions. Our goal is to build consensus.

Summary (cont.)

- CW Strategic Plan just released – this sets the goal for IWRM for the Corps;
- 2012 aligns Corps to focus on results both spatially (RITs) and (somewhat) across objectives (business lines);
- Work to reduce impediments to collaboration, and adaptive management;
- Move from project to systems focus.